Delta Mercury Control Program Phase 1 Methylmercury Control /Characterization Studies Independent Scientific Review Panel Charge

Background and Purpose

The Sacramento-San Joaquin Delta (Delta) is identified in the Clean Water Act's Section 303(d) list of impaired water bodies due to harmful levels of mercury in some fish eaten by people and wildlife. In response, the Central Valley Regional Water Quality Control Board (Regional Water Board) developed a Delta Mercury Control Program (Mercury Control Program) to control mercury and methylmercury in the Delta. The Mercury Control Program was adopted by the Regional Water Board as an amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) in April 2010. The Mercury Control Program received its final approval from the US EPA on 20 October 2011.

The Mercury Control Program is a two-phased process. During Phase 1, which began on October 20, 2011, the Regional Water Board required entities responsible for reducing methylmercury in the Delta to participate in studies to develop and evaluate ways to manage methylmercury. The Regional Water Board required development of study work plans, which were subsequently reviewed by a technical advisory committee to provide advice to ensure effective studies. These studies focused on different methylmercury source types by means of monitoring and pilot testing methylmercury controls. For several source types, characterization studies, rather than control studies, were approved. Characterization studies were necessary for some source types because additional information regarding mercury cycling and loads was needed before developing appropriate control studies and mercury models.

Prior to implementing Phase 2, the Basin Plan requires the Regional Water Board to conduct a Phase 1 Mercury Control Program review to inform re-evaluation of the Mercury Control Program including the fish tissue objectives, linkage analysis (between sources and objectives), modification of mercury goals, implementation actions, and allocations. The Regional Water Board has requested the Delta Science Program to convene two panels:

1. An independent scientific review panel (Review Panel) to conduct a "letter" review of the control and characterization study reports to assess compliance with approved work plans and evaluate the scientific validity of the studies' findings. Due to different due dates, the control study reports will be reviewed in 2019 and the characterization study reports (for tidal wetlands and open water studies) will be reviewed in 2020.

2. An independent advisory panel (Advisory Panel) to provide a holistic review of documents synthesizing available information and providing recommendations on Phase 2 implementation of the Mercury Control Program.

The scope of the charge described in this document is for the independent scientific review of the control study reports. An updated charge with questions for the characterization studies will be provided in 2020. The Review Panel's report will also help provide the Advisory Panel with context for their efforts. Ideally, the experts selected for the Review Panel would also participate in the Advisory Panel. [1]

Phase 2 of the Mercury Control Program begins after the completion of the Phase 1 Mercury Control Program Review and associated actions by the Regional Water Board and is expected to begin in or after 2022. During Phase 2, dischargers will implement methylmercury and inorganic (total) control programs as appropriate, based on the individual and aggregate findings of the methylmercury control and characterization studies, as well as recommendations from the Review Panel and Advisory Panel.

Scope of the Review

The focus of the Review Panel is to evaluate the scientific validity of the studies' results and conclusions and the completeness of the studies according to the previously approved work plans that were approved between November 2013 and February 2014. The primary documents to be reviewed are the final reports for the Mercury Control Program Phase 1 control and characterization studies, but the study workplans will also be reviewed to ensure the scientific objectives stated in these documents were met in each study. Findings from the Review Panel will provide the Advisory Panel with context for their efforts, while both the Review Panel recommendations and recommendations from the Advisory Panel will help inform decisions to be made by the Regional Water Board in developing Phase 2 of the Mercury Control Program. The reports contain results and conclusions from methylmercury control and characterization studies, propose methylmercury control plans, and evaluate the feasibility of attaining methylmercury load allocations associated with the program. Additional Delta-specific studies are provided for informational purposes (including dredging, wetlands, and irrigated agriculture; see complete list of reports at end of this document) but are not required for the review.

There will be two sets of letter reviews for the Review Panel due to two sets of deadlines for the reports under review. The first set of letter reviews will be conducted in spring 2019, consisting of reports for control studies that address methylmercury discharges from point sources (wastewater and urban stormwater runoff). The second set of letter reviews will be conducted in 2020, consisting of reports for characterization studies for tidal wetlands and a mercury model for open water in the Delta and Yolo Bypass. (The Department of Water Resources' reports for tidal wetland and open water modeling studies will not be completed until winter 2019 and mid-2020, respectively).

[1] The Advisory Panel will not be convened until the Review Panel has completed their work. The Advisory Panel will be asked to provide recommendations for science needs to inform future potential implementation measures for the CVRWQCB to consider when it revises the DMCP. The advisors would utilize the results of the methylmercury control study review, other background information, and the current state of mercury science to develop the recommendations. After identifying data and information gaps that still need to be addressed for mercury and methylmercury controls, the Advisory Panel would provide recommendations for further studies and implementation plans and advise on the priority of those proposed recommendations. CVRWQCB staff and the planning committee will develop a different set of charge questions for the Advisory Panel.

For each report, the Review Panel will provide written comments on how the report addresses the questions below. The Review Panel will have 45 days to familiarize themselves with the materials and following an internal Panel discussion meeting, have 30 days to develop a review report. The Review Panel may consider the results of other control studies or available information to expand the base from which the Review Panel draws conclusions.

Overview of reports

In the case of control studies, the responsible entities were required to evaluate existing methylmercury control methods according to approved work plans and, if needed, develop additional control methods that could be implemented to achieve methylmercury load and waste load allocations. Furthermore, while the control methods are based on the best available science, proposed control programs should consider the incorporation of future scientific findings and technological advances. Where appropriate, management actions were to be designed with adaptive management in mind. Control studies were conducted for point sources (wastewater and urban stormwater runoff).

In the case of characterization studies, entities were required to conduct studies to inform the development of methylmercury control actions for sources of methylmercury where there was substantial uncertainty in the production or loads of methylmercury. These studies included evaluations of methylmercury and total mercury concentrations and loads in source waters, receiving waters, and discharges to determine which discharges act as net sources of methylmercury and which land uses result in the greatest net methylmercury production. Characterization studies will help the Regional Water Board prioritize future control studies and implementation actions.

Questions pertaining to characterization reports

For this version of the Charge, questions pertaining to characterization reports are not included. Updates to questions pertaining to the characterization reports will be provided prior to the characterization review, based on review of the control studies.

Completeness and Adequacy of Individual Control/Characterization Study Reports

Responsible agencies completed control studies based on a work plan that they developed with TAC review and input, and approval by the Regional Board. The review questions below are intended to 1) evaluate whether the work plans were successfully completed, and 2) identify and synthesize key findings from the studies that can inform the Advisory Panel to implement an effective management program. It is not the intent of the review to develop recommendations to revise the control study final reports.

Specific scientific questions for review of the 2019 control study reports:

These questions apply to the control study reports:

1. Were the scientific objectives of the approved control study workplan fulfilled? Were the data quality control/quality assurance measures outlined in the report adequate?

2. Were the methods used in the study adequate to assess the scientific objectives?

3. Are the conclusions regarding the effectiveness of the control measures supported by the monitoring results in the report?

4. Does the report adequately characterize the source's current and future predicted loads based on methylmercury controls? Did the study adequately address the uncertainty around the load reduction estimates?
    a. If the study addressed existing controls, how well does the report evaluate existing control methods and, as needed, describe additional control methods (such as scaling up or combining controls) that could be implemented to achieve methylmercury load and waste load allocations? How adequate were evaluation methods, given available resources and workplan scope, in assessing the feasibility of reducing sources more than the minimum amount needed to achieve allocations?
    b. If the study addressed additional controls necessary to achieve allocations, does the report adequately describe methylmercury and/or inorganic (total) mercury control practices identified by the study and evaluate the effectiveness, potential environmental effects, and overall technical feasibility of the control actions?
    c. If the control study results indicate that achieving a given methylmercury allocation is infeasible, does the report adequately provide detailed technical information on why full compliance is not achievable and what methylmercury load reductions are achievable?
    d. Does the report adequately describe how the controls could be adapted over time as climatic and other conditions in the Delta change?

5. Do you have comments on any other scientific issues related to this study or mercury/methylmercury source?

Overall Assessment to Inform Independent Advisory Panel

The following questions are to be answered by each reviewer, as applicable, and compiled by the Lead Author. These will help in providing context for upcoming Advisory Panel.

1. What additional information would be needed, if any, to adapt the studies' results for changes in climatic and hydrologic conditions in the Delta?
2. Do we have enough scientific understanding of methylmercury sources and processes in the Delta and its tributaries to implement controls to meet current fish tissue objectives? If not, what additional information are needed and what additional studies should be undertaken to obtain this information?
3. Taken holistically, how do the study results encourage adjustments to the allocations?

4. Do the cumulative study results address the ability to control inorganic mercury and methylmercury sources to attain overall load and waste load allocations? Would the expected load reductions have measurable effects on fish tissue concentrations?
5. If some sources can feasibly reduce mercury/methylmercury sources more than the minimum amount needed to achieve allocations, can this adequately offset loads from other sources?

Review Materials

Final Control Study Reports and Associated Workplans (for Review in 2019)
Characterization reports to be provided in updated charge in 2020 to reduce confusion.

1. City of Stockton and County of San Joaquin (Urban Stormwater)
    a. Methylmercury Control Study Final Report
    b. Control Study Work Plan (Appendix A of Final Report)
2. Sacramento Stormwater Quality Partnership (Urban Stormwater)
    a. TMDL Phase 1 Implementation: Final Methylmercury Feasibility Report
    b. Delta Methylmercury Phase I Control Study Workplan
3. Contra Costa Clean Water Program (Urban Stormwater)
    a. Methylmercury Control Study Final Report
    b. Revised Methylmercury Control Study Workplan
4. Port of Stockton
    a. Methylmercury Control Study Final Report
    b. Revised Methylmercury Control Study Workplan
5. City of Sacramento (Urban Stormwater and Wastewater Combined)
    a. Combined Sewer System Methylmercury Control Study Final Report
    b. Methylmercury Control Study Workplan
6. Central Valley Clean Water Association (Municipal Wastewater)
    a. Methylmercury Special Project Group Methylmercury Control Study Final Report.
    b. Control Study Work Plan (Appendix A of Final Report)
7. California Department of Corrections Deuel Vocational Institution (Municipal Wastewater)
    a. Methylmercury Control Study Progress Report
    b. Methylmercury Control Study Workplan for the Delta Methylmercury Control Program Implementation Phase I

Supplementary Materials
These reports will be made available to the Review Panel to help inform the overall assessment questions, not for the completeness and adequacy questions. These reports will also be provided to the Advisory Panel to inform their recommendations for future studies and implementation actions.

1. Mercury on a Landscape Scale – Balancing Regional Export with Wildlife Health. USGS Open File Report 2018-1092. Prepared in cooperation with U.S. Environmental Protection Agency, U.S. Bureau of Land Management, CA Department of Fish and Wildlife, Central Valley Regional Water Board, Cosumnes River Preserve
2. Reports related to U.S. Army Corps of Engineers methylmercury monitoring related to dredging practices
    a. Methylmercury Control Study Workplan: Sacramento and Stockton Deep Water Ship Channels Operation and Maintenance Dredging
        i. Appendix A: Field Reports of 2009-2011 MeHg Studies
    b. Methylmercury Field Sampling Report: Sacramento and Stockton Deep Water Ship Channels Operation and Maintenance Dredging
    c. Roberts Island I: 2015 Methylmercury Monitoring Final Technical Report
    d. Bradford Island and Twitchell Island North: 2016 Methylmercury Monitoring Final Field Monitoring Report
    e. M01 Emergency Dredging Operations: 2017 Methylmercury Monitoring Final Field Monitoring Report
    f. Maintenance Dredging Operations: 2017 Methylmercury Monitoring Field Monitoring Report
3. Characterization of Methylmercury Loads for Irrigated Agriculture in the Delta. Final Report. Prepared for the U.S. Environmental Protection Agency.
4. CalFed Mercury Project 2008 Reports
    a. Full Document
    b. Table of Contents and Executive Summary
    c. Introduction
    d. Task 2
    e. Task 3
    f. Task 4
    g. Task 5
    h. Task 6
    i. Appendix Task 2
    j. Appendix Task 3
    k. Appendix Task 4
    l. Appendix Task 5

5. McCord, S and Heim, W. Identification and Prioritization of Management Practices to Reduce Methylmercury Exports from Wetlands and Irrigated Agricultural Lands. 2015. Environmental Management.
6. Department of Water Resources Cache Creek Settling Basin Study Reports
    a. Cache Creek Settling Basin Study Strategy Report
    b. 2nd Report of Findings: Mercury Control Studies for the Cache Creek Settling Basin, Yolo County, California